

Comparison of Renewable Energy Policies of China and the United States

1. Introduction

Renewable energy resources such as solar, wind, biomass and geothermal are abundant energy sources. The supply of renewable energy resources is inexhaustible practically, and using renewable energy poses very little environment risk. For a sustainable economic development, renewable energy has to be an integral part of the future energy system.

Using renewable energy is of particular importance to China. There are 800 million people living in rural areas and their annual energy consumption is about 600 million tons of coal equivalent (tce). Approximately half of this energy is supplied by renewable energy resources. 60 million people in China still do not have access to electricity, and over 65 million people in China are living in poverty. To improve the living of these people and at the same time to protect the environment, locally available renewable energy resources can play an important role in satisfying their energy demand.

The Chinese government has taken a conscious effort to develop renewable energy resources. Starting with the Eighth Five-Year Plan, renewable energy development and utilization have been an important part of the national development strategy. It is included in the "China Agenda 21," the "Guidelines of the Ninth Five-Year Plan," and the "Long Term Objectives on Economic and Social Development of China" as one of the national programs. To promote the renewable energy development, the State Council approved the "New and Renewable Energy Project in Priority" in 1995. These efforts have led to substantial development of renewable energy in China. However, many factors that have hampered the progress still remain. Issues such as the need for an integrated renewable energy policy, not enough investment, and lack of necessary non-technical infrastructure continue to limit the development and commercialization of renewable energy technologies. As a result, progress of renewable energy development not only fails to keep pace with the economic development, it also lags further behind many other countries.

China's economy is in a transition from central planning to free market. How to make renewable energy continue to grow under the new situation is a critical issue. The United States has developed a highly sophisticated market economy. American experience and technology are invaluable to many developing countries. Renewable energy is facing a series of challenges as a result of electric utility industry restructuring and deregulation. In response, the United States government and renewable energy industry have taken many policy initiatives to continue the development of renewable energy technologies. To fully understand the approach and experience of American renewable energy policies, the Center for Renewable Energy Development (CRED) of the Energy Research Institute, State Development Planning Commission, Government of China and the National Renewable Energy Laboratory (NREL), US Department of Energy (USDOE) have agreed to cooperate on a renewable energy policy analytic task. The objective is to develop a policy reform proposal to the relevant decision-makers of renewable energy development in China.

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3. Renewable Energy Policies and Their Goals

3.1 Policy Objective

Energy crises during the 1970s and the ever increasing pressure on the environment have turned the attentions of many countries to the renewable energy resources. Many countries have adopted various policies to accelerate the development of renewable energy technologies with a goal of having renewables become an important part of the energy supply system. There are two different but complementary approaches to achieve the goal. One type is aimed to improve the performance and reduce the cost of renewable energy technologies. This group of policy initiatives includes publicly supported research and development efforts to refine renewable energy technologies. Another type of policies is designed to enhance market opportunities and remove market barriers for renewable energy technologies. It includes policy initiatives to create a demand for renewables, increase production, improve renewable energy technology sales and services systems.

3.2 Types of Policies

Current and proposed renewable energy policies for supporting renewable energy are usually in one of the following four types:

- (1) Regulatory policies and government mandate
- (2) Economic Incentives
- (3) R&D Support
- (4) Market Development

4. Current Renewable Energy Policies of China

4.1 Government Policy Directives

The central government has taken the following measures to promote renewable energy:

- (1) In 1995 the Chinese Government promulgated the Electric Power Act. The Electric Power Act is the first Chinese law that discusses energy policy. In the first chapter (Introduction) it clearly states that China encourages the use of renewable and clean energy sources. Again in the sixth chapter (Rural Electric Systems Construction and Agricultural Sector Electric Supply) it emphasizes that China wants to develop water resources in rural areas and promote small hydropower systems for rural electrification. The deployment of solar energy, wind, geothermal, biomass, and other renewable energy resources will be encouraged and supported by the government.
- (2) The Guidelines of the Ninth Five-Year Plan and 2010 Long-Term Objectives on Economic and Social Development in China, approved by the Eighth National People's Congress, have become the primary guidelines for the Chinese government in energy development. Both stress that electric power development will be the core task of China's energy development and coal will be the fundamental energy resource. The guidelines also call for strengthening the explorations of oil and natural gas, actively developing new and renewable energy resources, and improving energy infrastructure. For rural electric development, the guidelines emphasize the importance of small hydro, wind, solar energy, geothermal, and biomass resources and that the development strategies should adapt to local conditions.
- (3) In 1996 the Ministry of Electric Power (MOEP) issued the "Parallel Operation Regulations for Wind Power Generation." It requires that the power grids must allow interconnection and parallel operations of wind farms, and that the power grids must buy all the electricity generated by the wind farms. It further specifies that the purchase price should include production cost, repayment of debt and interests, taxes, and a reasonable profit. The difference in prices between the wind energy and the average market price should be borne by all the customers of the power grid, not just the customers closest to the renewable energy projects.
- (4) The 1998 Energy Conservation Act again recognizes and emphasizes the importance and strategic role of using renewable energy to reduce emissions and to protect the environment.

Only Hebei and Shandong Provinces have taken the rural conditions into consideration and initiated regulations to encourage the use of renewable energy resources.

4.2 Economic Incentive Policies

(1) Import Duty Reduction

Import duty reduction is one of the most direct economic incentives offered to renewable energy development by the Chinese government. China has adjusted the import duty several times in the past few years to bring the overall import duty level compatible to that of the

most of the countries in the world. The average import duty now stands at 23%, but renewable energy technologies enjoy special low rates: of 3% for components of wind power plants, 6% for wind turbines, and 12% for PV systems.

(2) Reduction in Value Added Tax

The rate of value added tax (VAT) is 17%. Although not all renewable energy technologies enjoy reduced VAT rate, two of them do. Vat for biogas is only 3%, and VAT for small hydro is only 6%.

(3) Reduction in Income Tax

The income tax is collected by local government. Currently the corporate income tax rate is 33%. Governments of several provincial and autonomous regions have initiated special low income tax rates to encourage the development of renewable energy technologies. (See table)

(4) Favorable Purchasing Pricing

In addition to the pricing policy for wind energy established by MOEP in 1996, several local governments have decided to establish special favorable purchasing prices for electricity from renewable energy sources. For example, the municipal government of Shanghai has set special price for biogas for household cooking.

(5) Low Interest Loans

Chinese government has established specific low interest loans for rural energy development since 1987. The primary targets for this low interest loans are large and medium biogas projects, solar energy applications, and wind technologies. Interest rate of this special low interest loan is only half of that from a compatible commercial loans. The amount of low interest loan was increased to 120 million RMB in 1996. In addition, China also establishes special low interest loan programs for small hydro projects.

(6) Subsidies

Subsidies are often provided by the Chinese government to support renewable energy technologies. Subsidies provided by the central government usually support research, development and demonstration projects. Local governments also subsidize renewable energy development through price reduction of raw material. For example, Sichuan and Guangdong provinces offer special low prices for cement to be used to construct biogas facilities.

Table 1. Chinese Local Government Economic Incentive Policies

Region	Subsidy Policy	Taxation Policy	Price Policy	Loan Policy	Other Policies
Inner Mongolia	(1) (1986-1990) subsidize customer: 200 Yuan per set of 100 W wind power system or 16W PV system; total subsidy of 25.0 million Yuan of government funds. (2) 300,000 Yuan annual grant to support research and development. (3) rural energy office branches established in 56 counties, with government funds	(1) VAAT for windpower, reduced from 8% to 3%; (2) Income tax exemptions for two years; (3) VAT surtax on PV of 10.69-14.43 Yuan/16Wp-21.6Wp	(1) Purchasing price of windpower in 1995: 713 Yuan/MWh (including VAT), 609 Yuan/MWh (not including VAT) (2) Incremental price shared by the grid and consumer together, grid bear 200 Yuan/MWh, the remaining subsidized through a surcharge on electricity tariff of 2.5 Yuan/MWh	(1) 400 million Yuan has been arranged by SETC to support the wind power. (2) loan from Government of the Netherlands was given by SPC to support wind power.	Policy on land using: (1) impose land tax on land real occupied (2) remit the income tax of the cultivated land user for 5 years (3) remit the land tax for 10 years for those using uncultivated land
Xinjiang	(1) to subsidize the extension project: to offer subsidy to PV systems, small size wind power systems of 50-200 Yuan/system. (2) to subsidize R&D: over 1.0 million yuan each year (3) support institutional capability development, provide overhead to most rural energy office at county level. (4) to subsidize consumer of PV system with 300 Yuan or 10% of the cost/set	(1) Wind power: foreign owned or joint ventures with 10 or more years operation enjoy tax exemption for the first 2 years, tax reduction for the succeeding 3 years, and for the remaining 5 years the tax rate is 15%. VAT exempted for product exported. (2) PV system: the VAT and VAAT collected monthly, at 17% and 10% respectively; the income tax collected quarterly, at 15%-33%; the duty and VAT: exempt for international donation, others with 12% duty and 17% VAT.	(1) Purchasing price, in 1995, 698 Yuan/MWh (including VAT). In Xinjiang, the price of grid electricity is 1.18 Yuan/kWh. (2) Incremental price shared by the grid and consumer together. Impose 0.02 Yuan/kWh on fee, in which 0.5 cent/kWh is used to subsidize the price difference of wind power and the remaining is covered by the grid.		Wind power: collect charges on land usage according to the real areas occupied.

Region	Subsidy Policy	Taxation Policy	Price Policy	Loan Policy	Other Policies
Gansu	(1) Subsidize the extension of PV system: establish sun light fund subsidize 300 Yuan/set. (2) Subsidize R&D of PV. (3) Subsidize the establishment of technical supporting institutions	The taxation policy on PV system is similar to Xinjiang, only the monthly VAT rate of non grant PV system is 25%.		PV system: county government offer guarantee for SHS, the loan interest rate is 3%. The fund of discount is from addition fee of electricity: 3 Yuan/MWh; 20% of discount is from government finance.	Policy on land using (1) impose land tax on land real occupied (2) remit the income tax of the farm land user for 5 years (3) remit the land tax for 10 years for those using uncultivated land
Qinghai	(1) Subsidize the extension of PV system at 300 Yuan/set. (2) R&D: more than 500 Yuan annually to support Qinghai New Energy Research Institute. (3) Institution capability: provide overhead to most rural energy office at county level.		Impose addition fee of 2 Yuan/MWh, part of which (900 thousand Yuan) is used to support the consumer to install PV system		Wind power: collect charges on land usage according to the real areas occupied.
Northeast grid		After operation, the VAT is collected at 6%, but no reduce or remit of VAT (Hengshan in Liaoning) because of high price of attached power (900 Yuan/MWh),	Agree to determine the price of electricity connected to the grid as repayment with interest	Issue discount loan to wind power	Land tax is collected according to actual areas occupied by wind turbine, and to treat wind power enterprise as foreign fund enterprise
Guangdong		The VAT collected at 20 Yuan/MWh; the income tax collected at 51%	Repayment with interest, with the price of attached electricity being 770 Yuan/MWh. The difference borne by the consumer.		
Zejiang			Repayment with interest		

4.3 Government Supported R&D

Central government supports renewable energy by establishing R&D strategy and plan for the renewable energy industry and funding many R&D projects directly. R&D initiatives include the following three major areas:

- (1) Support various renewable energy research institutes and research projects.
- (2) Target specific technologies for improvement and provide necessary training. Incomplete figures suggest that more than 100 million RMB will be used for this purpose during the Ninth Five-Year Plan.
- (3) Subsidize renewable energy demonstration projects. For example, central government invested 7 million RMB in four PV generation stations (total capacity 85 kW) during the Eighth Five-Year Plan.

4.4 Market Development Policy for Renewables

Implementing renewable energy market development activities is just beginning in China. One approach is for the government to establish a revolving loan fund support the renewable energy applications. For example, the municipal government of Shanghai appropriates 10 million RMB for a revolving loan fund to advance biogas applications within the city limit.

China also starts initiatives to reform business practices as a means of reducing non-financial barriers for renewable energy development. For example, the State Development and Technical Commission requested for proposals and awarded the contract for a polycrystalline thin-film PV manufacturing facility through bidding process in carrying out one of the Ninth Five-Year Plan targeted technology improvement programs. A recent project of an anaerobic treatment plant for urban waste water in Yiwu Xian, Zhejiang Province employed a similar bidding process to award the final construction contract. Reforming business practices can resulting in lower cost and higher quality renewable energy projects.

Table 1 summarizes the incentive policies enacted by the local government.

5. Current Renewable Energy Policies in the United States

In response to the energy crises of the 1970s, the U.S. government has enacted several energy policy acts during the 1970s and 1980s to increase energy efficiency and reduce dependency of imported oil. For example, the Energy Policy and Conservation Act of 1975 (P.L. 94-163) established corporate average fuel efficiency (CAFE) standards for new passenger cars and light trucks, and the National Appliance Energy Conservation Act (NAECA) of 1987 prescribed minimum efficiency standards for most home appliances and equipment. Various federal and state incentive policies are summarized below.

5.1 Regulatory Policies and Mandate

5.1.1 Federal policies

(1) 1978 Public Utilities Regulatory Policies Act

The 1978 Public Utilities Regulatory Policies Act (PURPA) with its subsequent implementation rules (Code of Federal Regulations [CFR], Title 18, Part 292) by the Federal Energy Regulatory Commission (FERC) is the prime stimulus to the development of non-hydro renewable energy electric applications. The Act is expressly formulated to encourage power projects to conserve oil and natural gas, namely cogeneration systems with higher thermal efficiency and small power generators using waste fuels and renewable energy resources. PURPA requires electric utilities to interconnect with and purchase power from "qualifying facilities" (QFs) at utility's "avoided cost." Or the cost that the utility would have incurred by supplying the power itself. QFs are generating facilities that meet certain energy efficiency and size criteria or use renewable energy resources. PURPA proved to be an effective measure in encouraging alternative power development. The incentive comes from the high avoided cost power purchase schedules that were established by some states in the early stages of PURPA implementation. In particular, large amount of QF development occurred in California because favorable avoided cost pricing terms pegged to projections of rising oil prices provided QF developers with long-term price certainty needed for obtaining project financing.

(2) 1978 Energy Tax Act

This Act provided various tax incentives and 5-year accelerated depreciation schedule for renewables. All except the 5-year accelerated depreciation are expired now.

(3) 1990 Clean Air Act Amendment

The 1990 Clean Air Act Amendment (CAAA) mandates an annual reduction of SO₂ emissions by 10 million tons and an reduction of annual NO_x emissions by 2 million tons from the 1980 levels for all man-made sources. It established a market-based SO₂ allowance trading system that allows utilities to adopt the most cost-effective strategy to reduce SO₂ emissions. The Act allows the Environmental Protection Agency to provide SO₂ allowance to utilities as incentives for achieving SO₂ emission reductions through customer-oriented conservation measures or renewable energy generation. Utilities can use the allowance to offset SO₂ emissions from their own power plants or to sell the allowance to other utilities.

(4) 1992 Energy Policy Act

The 1992 Energy Policy Act (EPACT) encourages electricity supply competition by mandating open access of the transmission grid and the creation of Exempted Wholesale Generators (EWGs), which have minimal regulatory oversight. The intention is to reduce nonfinancial market barriers for renewables.

5.1.2 State Policies

Individual states also adopt many policies and programs to encourage the development and commercialization of renewable energy.

(1) State Mandate

State mandate is another way for state to encourage the development of renewable energy. Two states have enacted laws that require utilities within the state to install a fixed amount of renewable energy generating capacity. No public funding is involved in the state mandate programs. The projects are financed by utilities who will recover their cost through electric rates approved by the state public utility commission.

- Iowa passed the Alternate Energy Law in 1991. The new law requires investor-owned utilities to purchase a combined total of 105 MW from renewable and small hydropower sources. The Iowa Utilities Board has allocated it among the state's three investor-owned utilities based on each utility's percentage of the total Iowa retail peak demand. The majority of the capacity will be met with wind power and biomass applications.
- The Minnesota legislature has required Northern States Power Company (NSP), an investor-owned utility, to install 425 MW of wind power and 125 MW of biomass power by December 31, 2002 in exchange for a permission of the temporary cask storage of nuclear power plant waste at Prairie Island. Minnesota legislature further requires NSP to install additional 400 MW of wind power by 2008 if study shows wind power is the least cost option for new generation.

State mandate has been effective in terms of the renewable energy capacity actually installed.

(2) System Benefits Charge

System benefits charge (SBC) is a state initiative to support renewable energy and other public good programs such as energy conservation and low income support. Many states are in the process of restructuring their electric utility industry. The objective is to lower the cost of electricity by introducing real competition in the utility industry. One consequence of competition in the utility industry is the deregulation of rate. Instead of guaranteed rate of return through regulated rate, the market will set the electric rate. To be competitive in the marketplace, utilities naturally will want to cut expenses and install the lowest cost supply options. With today's low fossil fuel prices, many renewable energy options that require higher capital costs will be excluded from utility's generation mix. In order to continue supporting renewables and other public good programs, several states have established the SBC, collected through a surcharge on electricity, to fund these programs.

- California. As part of its electric industry restructuring legislation, California will support new, existing, and emerging renewable electricity generation technologies through a non-bypassable SBC. It will provide \$540 million in rate subsidies for renewables projects over four years (1998-2001) to enable them to compete with conventional fossil fuel sources. The amount of the surcharge is not yet entirely defined. It will likely be between 2 and 3 mills depending on the electric supplier. This money will be used to provide renewable energy production incentives similar to the federal REPI

payment, rebate for emerging renewable energy technologies (mostly PV), and buy-down of residential renewable energy facilities.

- Illinois. The Illinois legislature has created the Renewable Energy Resources Trust Fund and the Energy Efficiency Program in 1997. The Renewable Energy Resources Trust Fund will support renewables through grants, loans and other incentives administered by the Department of Commerce and Community Affairs. Funding for the renewable trust fund comes from a flat fee of \$0.50 per month paid for by residential and small commercial electric and gas customers. Large commercial electric customers having a peak electric demand greater than 10 MW and using more than 4,000,000 therms of gas in the previous calendar year must pay \$37.50 per month. Total revenue for this fund is expected to be about \$100 million over ten years. From this money, 50% goes toward the Renewable Energy Resources Trust, and the remaining 50% goes to the Coal Technology Development Assistance Fund. For the Energy Efficiency Program each electric utility and retail electric supplier shall annually contribute a pro rata share of a total amount of \$3 million based on their kilowatt hour sales. Money from this program will be distributed by the Department of Commerce and Community Affairs to residential electric customers. Eligible projects include energy efficiency efforts for low income households and other energy efficiency improvements.
- Massachusetts. Massachusetts has created the Massachusetts Renewable Energy Trust Fund as part of its electric utility restructuring legislation. This trust will be funded through a universal wires charge or system benefits charge. Total funding will be about \$150 million over a five year period, and approximately \$20 million per year after 2002 for an undefined period (subject to legislative review). The legislation establishes the following schedule of charges for the renewable energy trust fund: \$0.00075/kWh in calendar year 1998; \$0.001/kWh calendar year 1999; \$0.00125/kWh in calendar year 2000; \$0.001/kWh in calendar year 2001; \$0.00075/kWh in calendar year 2002; and \$0.0005/kWh in each calendar thereafter. The Massachusetts law also mandates five year funding totaling roughly \$500 million for energy efficiency investments (through separate surcharges).
- Montana. As part of its 1997 legislation to restructure the state's electric utilities, Montana established a Universal System Benefits Program (USBP). Beginning July 1, 1999 all electricity suppliers will annually contribute 2.4% of their 1995 revenues to the USBP. The funds collected will go toward supporting energy efficiency, renewable energy resources, low-income energy assistance, and renewable energy research and development. The fund will have a four year life span from July 1, 1999 to July 1, 2003.
- New York. The lesser of 0.1¢/kWh or utility 1995 spending level for energy efficiency, R&D, and low-income support for 1998-2001.
- Rhode Island. Under Rhode Island's electric utility industry restructuring law, the Rhode Island legislation established a non-bypassable SBC to support the development of renewable energy and demand side management programs. The charge is \$0.0023/kWh for a minimum of five years. This charge is collected by each electric distribution

company, and in 1997, the first full year that the charge was collected, \$17 million was raised. The Public Utility Commission may increase the per kilowatt-hour charge before the end of the first five year period. After five years, the Commission will determine the future level of the charge. Thus far, the majority of the money raised through the charge has gone toward existing demand side management programs. The 1998 budget for renewable energy programs is roughly \$1 million. Renewable energy sources included are "wind, small scale (less than 100 megawatts) hydropower plants that do not require the construction of new dams, solar energy, and sustainably managed biomass." Fuel cells are included under demand-side management programs.

(3) Renewable Portfolio Standard

The Renewables Portfolio Standard (RPS) is a market-driven policy to ensure that a minimum amount of renewable energy is included in the portfolio of electricity resources serving a state or country. By increasing the required amount over time, the RPS can put the electricity industry on a path toward increasing sustainability. Because it is a market standard, the RPS relies almost entirely on the private market for its implementation.

- Arizona. Arizona Corporation Commission's Solar Portfolio standard requires that by January 1, 1999 any electric service provider selling electricity in Arizona must have 0.5% of its energy from new solar resources. The amount increases to 1% on January 1, 2002. A penalty for sellers not meeting the solar portfolio standards is the voiding of their contracts with their customers. New solar resources include photovoltaic and solar thermal generating facilities that were installed after January 1, 1997, and utilities have the option of generating or purchasing that solar power they sell. The ruling includes an incentive provision encouraging utilities to construct their own solar generation units before January 1, 1999. Those who generate their own solar energy before January 1, 1999 are given double credit for the capacity that they install. That is, a utility that operates its own solar facilities that generate 0.25% of its total energy before January 1, 1999, for example, would meet the 0.5% solar portfolio standard.
- Maine. As part of the state's electric utility restructuring legislation passed in May, 1997, Maine has included a 30% RPS for electricity suppliers to begin on March 15, 2000. Eligible technologies include hydropower, biomass, municipal waste methane recovery, wind and solar. However, over 50% of the state's capacity is already from renewable resources (most of this renewable capacity is hydropower and biomass).
- Massachusetts. As part of its electric utility restructuring legislation, Massachusetts has created the outlines for a renewable portfolio standard. The legislation requires that energy from new renewables (begin commercial operation or represent an increase in capacity at an existing facility after December 31, 1997) must equal 1% of total electricity sales by December 31, 2003, or one year after any renewable is within 10% of average spot-market price. After December 31, 1998, waste-to-energy and hydroelectric sources cannot be included as part of those renewables used to meet the standard. The standard will increase by an additional 0.5% per year through 2009 and 1% per year thereafter.

- Nevada. Nevada requires that 0.2% of the electricity sold in state must be from renewables in 2002 and increases to 1% by 2010. Half of the required energy must be from solar energy.

Neither SBC nor RPS has withstood the test of time. It is still too early to assess their impact.

(4) Net Metering

Net metering is a simple, low-cost, and easily administered method to encourage direct customer investment in renewable energy technologies. This practice allows the electric meter of customers with generating equipment to turn backwards when their generators are producing more energy than the customers' demand. Customers can use their generation to offset their consumption over the entire billing period. Net metering is an appealing policy option at the state level. It provides economic incentives to support renewable energy technologies that do not require direct public funding. 23 states now have net metering programs through legislative and regulatory processes. Although all these programs are similar in concept, differences exist in how they are implemented in terms of eligible participants, eligible renewable energy technologies, generator sizes, treatment of excess energy, and overall net metering capacity allowed.

The biggest problem facing net metering programs is the opposition from many utilities. Some maintain that paying retail prices for customer-generated electricity amounts to a subsidy because retail prices also include the costs of transmission and distribution, administration, and profits in addition to a utilities' energy cost. Others concern about revenue losses and safety issues. Even with the net metering law, utilities are still able to hinder its implementation by establishing various and sometimes difficult interconnection requirements.

Summary of State Net Metering Programs

State	Allowable Technology and Size	Allowable Customer	Statewide Limit	Treatment of Net Excess Generation (NEG)	Enacted
Arizona	Qualifying facilities [1] ≤ 100 kW	All customer classes	None	NEG purchased at avoided cost	1981
California	Solar only ≤ 10 kW	Residential only	0.1% 1996 peak	NEG purchased at avoided cost	1995
Colorado	Qualifying facilities ≤ 10 kW	All customer classes, Public Service of Colorado only	None	NEG credited to next month	1994
Connecticut	Renewables ≤ 100 kW Cogenerators ≤ 50 kW	All customer classes	None	NEG purchased at avoided cost	1990
Idaho	All technologies ≤ 100 kW	All customer classes	None	NEG purchased at avoided cost	1980
Indiana	Qualifying facilities ≤ 1,000 kWh/month	All customer classes	None	No purchase of NEG, Excess is granted to utility	1985
Iowa	Renewables No limit per system	All customer classes	None	NEG purchased at avoided cost	1993
Maine	Qualifying facilities	All customer classes	None	NEG purchased at avoided cost	1987

State	Allowable Technology and Size	Allowable Customer	Statewide Limit	Treatment of Net Excess Generation (NEG)	Enacted
	≤ 100 kW				
Maryland	Solar only ≤ 80 kW	Residential only	0.2% of 1998 peak	No purchase of NEG, Excess is granted to utility	1997
Massachusetts	Qualifying facilities ≤ 60 kW	All customer classes	None	NEG purchased at avoided cost	1997
Minnesota	Qualifying facilities ≤ 40 kW	All customer classes	None	NEG purchased at utility average retail energy rate	1983
Nevada	Solar & Wind ≤ 10 kW	All customer classes	First 100 customers for each utility	No purchase of NEG, Excess is granted to utility	1997
New Hampshire	Solar, wind and hydro ≤ 25 kW	All customer classes	0.05% of utility's annual peak	NEG credited to next month	1998
New Mexico	Qualifying facilities ≤ 100 kW	All customer classes	None	NEG purchased at avoided cost with additional customer charge, or no NEG purchase and no additional charge	1988
New York	Solar only ≤ 10 kW	Residential only	0.1% 1996 peak demand	Annualized NEG purchased at avoided cost	1997
North Dakota	Renewables & cogeneration ≤ 100 kW	All customer classes	None	NEG purchased at avoided cost	1991
Oklahoma	Renewables & cogeneration ≤ 100 kW and ≤ 25,000 kWh/year	All customer classes	None	No purchase of NEG, excess is granted to utility	1988
Pennsylvania	Solar only (None specified)	Residential only	None	NEG purchased at average utility billing rate	1996
Rhode Island	Renewables & cogeneration ≤ 25 kW for larger utilities ≤ 15 kW for smaller utilities	All customer classes	None	NEG purchased at avoided cost	1985
Texas	Renewables only ≤ 50 kW	All customer classes	None	NEG purchased at avoided cost	1986
Vermont	PV, wind, fuel cells ≤ 15 kW Farm system ≤ 100 kW	All customer classes	1% of 1996 peak	Any NEG at the end of a year is granted to utilities	1998
Washington	Solar, wind and hydropower ≤ 25 kW	All customer classes	0.1% of 1996 peak demand	Annualized NEG granted to utilities at the end of each calendar year	1998
Wisconsin	All technologies ≤ 20 kW	All customer classes	None	NEG purchased at retail rate for renewables, avoided cost for non-renewables	1993

Notes: [1] Qualifying facilities generally mean a small cogenerator or a renewable energy production facility.

(5) Solar and Wind Access Laws

33 states have enacted laws to protect the access or use of solar energy. A common form of solar access law is solar easement. Four states allow for the creation of wind easements.

(6) Miscellaneous Policy Initiatives

There are other state initiated programs such as disclosure rules (to disclose utility fuel mix and emissions information so the public is aware of the environmental impact), state construction policies (to require the consideration of renewable energy options in state construction projects), and solar contractor licensing and training and solar equipment certification (to assure the quality and safety of installed solar energy and increase customer confidence).

5.2 Economic Incentives

The federal government's renewable energy production incentive and tax credit are major economic incentives for renewables right now. Many states also offer tax incentives to promote renewable energy manufacturing and deployment within the state.

5.2.1 Federal Economic Incentive Policy

1992 Energy Policy Act

The 1992 Energy Policy Act (EPACT) established several policy incentives for renewables:

- A permanent 10% energy tax credit for solar energy and geothermal projects. However, this tax credit is not available to utility owners.
- A 10-year, 1.5¢/kWh production tax credit (PTC) for wind and closed-loop (energy crop) biomass projects. The 1.5 ¢/kWh is indexed to the general inflation rate, and it has risen to about 1.65 ¢/kWh in 1997. To qualify for the REPI, the renewable energy facilities have to be operational before July 1, 1999. The PTC is only good for the first 10 years of operation.
- A 10-year, 1.5¢/kWh renewable energy production incentive (REPI) payments for electricity produced and sold by new (operations first started between October 1, 1993 and September 30, 2003) qualifying renewable energy generation facilities that are owned by State entities, municipal utilities, and not-for-profit electric cooperatives. The 1.5¢/kWh REPI payment is indexed for inflation, and subject to the availability of annual appropriations by the Congress. Qualifying facilities must use solar, wind, geothermal (with certain restrictions as contained in the rulemaking), or biomass (except for municipal solid waste combustion) generation technologies. In the first year of the REPI program, there were sufficient appropriations to make full production incentive payments of \$693,120 to the owners of all qualifying facilities. In the second year of the REPI program, there were sufficient appropriations to make full production incentive payments of \$2,398,472 to the owners of all qualifying facilities. For the third year of REPI the available funds of \$2,490,893 are insufficient to make full production payments to the owners of all qualifying facilities. Therefore, full payments have been made for electricity produced by tier 1 facilities (solar, wind, geothermal and closed-loop biomass) and partial payments on a pro rata basis have been made for tier 2 facilities (open-loop biomass such as landfill gas, biomass cofiring at coal plant).

5.2.2 State Economic Incentive Policies

(7) State Tax Incentives

Tax incentives at the state level include income tax credit (both personal and corporate income taxes), sales tax exemption, and property tax incentives.

Eleven states offer personal income tax credit for purchasing and installing of renewable energy equipment (Alabama, Arizona, Hawaii, Idaho, Massachusetts, Montana, New York, North Carolina, North Dakota, Oregon, and Utah). Oregon's incentive is unique in that its personal income tax credit for renewable energy systems is based on actual production of renewable energy, not the amount of spending on the facilities.

Twelve states give corporate income tax credit for investing in renewable energy systems (Arizona, Connecticut, Hawaii, Massachusetts, Minnesota, Missouri, Montana, North Carolina, Ohio, Oregon, Texas, and Utah). Missouri is the only state that bases its corporate tax credit for renewable energy actual production levels—not the amount of investment for renewable energy equipment.

Eleven states exempt sales tax on equipment and material used to manufacture, install, and operate renewable energy facilities (Arizona, Connecticut, Florida, Hawaii, Iowa, Maryland, Massachusetts, Minnesota, New Jersey, Ohio, and Washington).

Property Tax Incentives include full exemption of property tax for renewable energy facilities and special assessment for property tax (such as reduced mill levy, reduced value assessment, or property tax credit). Comparing to the conventional fossil-fueled generating technologies of the same size, renewable energy technologies are much more capital intensive, but they do not have fuel cost. Property tax, however, is based on the plant value, which is directly proportional to the capital investment of the plant. As a result, renewable energy technologies pay substantially more in property tax than a conventional power plant of the same size. Reduction or exemption of property tax, therefore, can offer a significant financial incentive to the renewables. Nineteen states currently offer some forms of property tax incentives (Connecticut, Illinois, Indiana, Iowa, Maryland, Massachusetts, Minnesota, Nevada, New Hampshire, North Carolina, North Dakota, Ohio, Oregon, Pennsylvania, South Dakota, Texas, Virginia, and Wisconsin).

5.3 Publicly Funded R&D

Publicly funded R&D programs are another form of government support to renewable energy technologies. While the majority of federal renewable R&D funds has been supporting direct research at the national laboratories and academia, an increasing emphasis is to leverage federal R&D funding with projects that are cost shared with industry.

5.3.1 Federal R&D Program

There is no spending target for federal renewable R&D programs. The funding levels fluctuate significantly over the years.

Table 2. U.S. Renewable Energy R&D Funding (\$ million)

Year	Funding
1974	28.8
1975	117.8
1976	225.0
1977	547.9
1978	817.0
1979	1,108.6
1980	1,205.1
1981	1,077.3
1982	516.8
1983	389.8
1983	317.1
1985	289.7
1986	213.9
1987	194.2
1988	152.0
1989	133.5
1990	123.1
1991	163.5
1992	228.1
1993	219.0
1994	329.4
1995	393.0
1996	272.0

Source: NREL Director's Office

Federal government through national research laboratories and institutes collaborates with renewable energy industries extensively to leverage public funding in carrying out many R&D projects. A common mechanism for cooperative projects is cost sharing among participants. A few representative cases are described below.

– Photovoltaic Manufacturing Technology (PVMaT) Project

The Photovoltaic Manufacturing Technology (PVMaT) Project was initiated in 1990 to help the U.S. photovoltaic (PV) industry extend its world leadership role in manufacturing and in developing commercial PV modules and systems. It is a research and development (R&D) partnership between the U.S. federal government (through the U.S. Department of Energy) and members of the U.S. PV industry. The project is designed to help the U.S. PV industry improve manufacturing processes, accelerate manufacturing cost reductions for PV modules, improve commercial product performance, and lay the groundwork for substantially scaling up the capacity of U.S.-based PV manufacturing plants. It is being conducted in several phases, each aimed at supporting the specific needs of the PV industry as it works toward reducing module cost and scaling up production capacity.

Total funding for PVMaT, including projected funding to the end of Phase 4A, is \$118 million. 43% of this is cost shared by industry. The technology areas are crystalline silicon, concentrators, amorphous silicon, cadmium-telluride-based systems, copper-indium-diselenide-based systems, and general areas such as encapsulation, system integration, and balance of systems.

- Wind Turbine Performance Verification Program

The Wind Turbine Performance Verification Program (TVP) was a project developed by the Electric Power Research Institute (EPRI) and the U.S. Department of Energy (DOE). The program initiated in 1992. The purpose is to provide a bridge from utility-grade turbine development programs under way to commercial purchases of the wind turbines. The TVP allows utilities and turbine manufacturers to obtain valuable experience in wind power plant development, operations and maintenance, and technology transfer. The program is funded through contributions from EPRI, DOE, and host utilities. EPRI manages the program on behalf of the funding organizations.

- Next Generation Wind Turbine Development

Zond Systems, Incorporated, Tehachapi, California, and The Wind Turbine Company, Bellevue, Washington, with major support from the Dow Chemical Company and United Technologies Corporation, were awarded subcontracts by NREL to design and test a new generation of wind turbines that will use the most recent technology in all aspects of wind turbine engineering. The two companies will use lessons learned from previous turbine development projects to develop prototype turbines to significantly lower the cost of wind-generated electricity. The companies were among 10 selected last year for the first phase of the project, a Concept Definition Study. The selected companies will make significant financial contributions to the \$33 million project.

- The Million Solar Roofs Initiative

The U.S. Department of Energy initiated the Million Solar Roofs Initiative in 1997. The goal is to enable businesses and communities to install solar systems on one million rooftops across the United States by 2010. The Department of Energy will lead this initiative by working with partners in the building industry, local governments, state agencies, the solar industry, electric service providers, and non-governmental organizations to remove market barriers and strengthen grassroots demand for solar technologies. Key features of this initiative include voluntary participation by state and local governments, leveraging other financial support and incentives, and accelerating the use of solar energy systems on federal buildings.

In addition to provide R&D funding, federal government also establish renewable energy development strategies and goals. For example, working with industry, U.S. DOE has formulated development strategies for wind energy technology and proposed ambitious short- and long-term goals. The target is to reduce wind energy cost to 2.5¢/kWh and reach a total installed wind

generating capacity of 10,000 MW by 2010. A key to achieve these goals is continued government support of wind energy technology research.

5.3.2 State Research and Outreach Programs

Several states have created research and outreach centers that actively promote renewable energy through R&D and other outreach programs. Examples of state supported R&D and outreach programs include: California Energy Commission, Florida Solar Energy Center, Iowa Energy Center, Kansas Electric Utilities Research Program, New York State Energy Research and Development Authority, North Carolina Solar Center, and Washington State Cooperative Extension Service's Energy Program.

5.4 Renewable Energy Market Development Measures

Establishing technical standards and codes for renewable energy technologies and renewable energy resource assessment are two other activities that are supported by federal and state governments. Although it is not directly related to the improvement of technology performance, technical standards and codes are important in establishing customer confidence and accelerating the commercialization of renewable energy technologies. Resource assessment activities provide valuable information to advance the renewable energy market. Knowing where a renewable energy resource may exist is valuable to developer or energy user because it allows them to focus on a general area for more detailed examination. General resource information also helps policy-makers devise sensible strategies to develop renewable energy.

5.5 Other Development

Although it is generally agreed that increased use of renewable energy sources can provide important environmental benefits, electric utilities in the United States are reluctant to make new investment in renewable energy technologies. Higher cost of renewable energy and the uncertainty surrounding electric utility restructuring are the two major factors. Green pricing is a recent development in the utility industry to overcome these problems.

Green pricing is an optional utility service that allows customers to support greater utility company investments in renewable energy by paying a price premium to cover the higher costs of renewable energy technologies as compared to other power sources. Green pricing is not driven by government policies, but a utility response to a strong customer preference for clean energy. This preference has been revealed through numerous public opinion surveys as well as utility customer surveys. Utilities regard these green programs as a way to test the market for renewable energy and unbundled services with a minimum of market risk, in advance of electric market competition. More than 30 utilities have either already implemented or have announced plans to offer a green pricing option. It has become an important impetus for renewable energy market in the United States.

Customers voluntarily participate in the green pricing program and pay a higher price for electricity generated from renewable energy resources or to support a specific renewable energy project. The rates charged for these “green” power are generally cost-based. However,

significant price variations exist among different utility green pricing tariffs. The following table lists examples of utility green pricing programs.

State	Utility	Renewable Technology	Monthly Premium
Arizona	Arizona Public Service	PV	\$3 per 100 Watts
Arizona	Salt River Project	PV	\$3 per 100 Watts
California	Sacramento Municipal Utility District	All renewables	1.0¢/kWh
California	Los Angeles Department of Water & Power	PV and wind	\$2~\$5 per month
Colorado	Public Service Company of Colorado	Wind	2.5¢/kWh
Colorado	Colorado Springs Utilities	Wind	3.0¢/kWh
Colorado	Fort Collins Light & Power	Wind	2.0¢/kWh
Colorado	Holy Cross Electric Association	Wind	2.5¢/kWh
Michigan	Detroit Edison	PV	\$7.3 per 100 Watts
Michigan	Traverse City Light & Power	Wind	1.58¢/kWh
Minnesota	Cooperative Power Association	Wind	2.0¢/kWh
Minnesota	Dakota Electric Association	Wind	2.0¢/kWh
Minnesota	Moorhead Public Service	Wind	0.5¢/kWh
Minnesota	Northern States Power	PV	\$50 for 2 kW
Nebraska	Lincoln Electric System	Wind	6.0¢/kWh
Oregon	Bonneville Power Administration	Wind, geothermal	1.0¢/kWh
Oregon	Portland General Electric	Wind, geothermal	1.0¢/kWh
Texas	City of Austin	PV	\$3.5 per 50 Watts
Texas	West Texas Utilities	Hydro	2.0¢/kWh
Wisconsin	Madison Gas & Electric	Wind	4~5¢/kWh
Wisconsin	Wisconsin Electric Power Company	Hydro, biomass	2.04¢/kWh

6. Comparison and Analysis of Renewable Energy Policies of China and the United States

6.1 Comparison of Government Mandates

Both China and the United States adopt policies to advance the development of renewable energy technologies. Experience has suggested that enacting public laws to implement policies is one of the most effective measures for supporting renewables. For example, the 1978 PURPA, which requires utilities to purchase electricity from power plants using renewable energy at utility's avoided cost, has helped creating a favorable business environment for renewable energy technologies. As a result, renewable energy technologies have established a strong installation base in the United States.

In 1995 the Chinese government enacted the Electric Power Act, which explicitly encourage power grid to employ renewable energy resources for electricity generation. The MOEP issued the "Parallel Operation Regulations for Wind Power Generation" in 1996 that required power grid to purchase energy from wind farms and established a pricing principle. These two initiatives also have had certain impacts on the renewable energy development in China.

However, there are major differences between the ways government policies of China and the United States are implemented. The Chinese laws enacted to support renewable energy policies usually contain a general framework. They describe the intent of the law and cover basic principles, but they lack detailed implementation rules and regulations and specific implementation targets. Although they afford government agencies maximum flexibility in executing, the drawbacks of nonuniform interpretation of the laws and lack of specific policy goals often hinder the actual implementation.

In contrast, United States renewable energy policy initiatives have several distinctive features. The laws themselves and rules subsequently issued to implement the intent of the laws contain great details that clearly define the procedures and the goals. It makes the laws and policies transparent to all stakeholders. Implementation is not subject to the interpretations of individuals and various government agencies. The United States renewable energy policies and laws are continuously evolving to reflect the lesson learned and to adapt to changing social and market conditions. Furthermore, in the United States, individual states often enact their own statutes on promoting renewable energy. State initiatives address specific local conditions and, therefore, complement the federal policies and laws. This integrate approach makes a more effective mechanism in supporting renewables.

6.2 Comparison of Economic Incentive Policies

Both governments use similar economic incentive options for publicly-leveraged market-driven deployment of renewable energy technologies. Four types of economic incentive options have been used.

(1) Government Subsidies

This is a common economic incentive policy option in China. The United States also implements this option for selected renewable energy technologies. For example, Chinese government subsidizes small hydropower development in rural areas. The United States used direct subsidy before. However, current American financial subsidies are geared toward actual production or renewable energy, not simply the capital investment of renewable energy technologies. An example is the renewable energy production incentives in California. China does not have renewable energy production incentives.

Another form of economic incentive for renewable energy is direct subsidy to customers. China has subsidized customers of solar energy, small wind turbines, rural biogas applications, high-efficiency stoves, and biomass applications. California offers rebate to residential customers installing PV systems.

Direct government subsidies to renewables are effective in accelerating the renewable energy market. However, there several issues with government subsidies. One is the source and availability of fund. Government has to make large capital investment in order to significantly stimulate the development of renewable energy markets. In the United States, funding for subsidies comes from special levies of electricity consumption (system benefit charge). In China, it is from the government's general revenue. Facing financial constraints,

fund for subsidy is limited and its long-term availability is uncertain. The strategy and objective of government subsidy is another issue. Who should receive the subsidies, the level of subsidies, the developmental goal of subsidies, and who will decide are important issues that need to be addressed.

(2) Tax Incentives

Tax policy options can have many forms: income tax credit, investment tax credit, property tax exemption (or reduction), accelerated depreciation are examples of the former. With this form of tax incentive option, government forgo revenues to promote investment in renewable energy technologies. This is a common policy option in the United States. Although it is effective in increasing investment, this policy option does not have direct impact on reducing the renewable technology cost. A case in mind is the favorable tax credit for solar water heater in the United States in the 1980s. Although the tax credit did create a boom in the solar water heater market, the market collapsed after the tax credit expired. China also has similar tax incentives for renewable energy technologies (reduced income tax and reduced VAT). It is very important to link tax incentives with technology improvement and market performance.

(3) Price Policies

Both Chinese and the American governments establish pricing policies for renewables. In the United States, 1978 PURPA specified utility's avoided cost as purchasing price for renewable energy generated electricity. Chinese government issued a pricing principle in 1994 requiring power grid to include production cost, debt service, taxes, and reasonable profits in determining purchasing price of wind energy. The difference is PURPA price applies to all renewables and is enacted by the Congress, but the Chinese pricing principle is only for wind power and is issued by the MOEP as an executive order. In the United States, the costs of price policies are borne by individual electric utility customers. In China it is borne by the customers of the entire power grid. The overall impact of price policies on the cost of electricity is relatively minor because the installed capacity of renewable energy technologies in the power system is small.

Past development in the United States has shown that price policy can be a very power tool in facilitating the deployment of renewable energy technologies.

(4) Low Interest Loans and Interest Subsidies

Low interest loans and interest subsidies can reduce the construction and production costs of renewable energy technologies. Funding availability determines the extent and sustainability of this policy option. Except for a few state initiated low interest loans and interest subsidies programs with limited scope, the United States federal government does not use this policy option. This incentive is not widely used in China either. From a policy point of view, the key issues are how to select the targets for support and the most effective level of support.

6.3 Comparisons of Renewable Energy R&D Policies

It is the policy of both Chinese and the United States governments to support renewable energy R&D. Both countries have made substantial investment in the renewable energy R&D and have established dedicated renewable energy research institutes. However, there are substantial differences between these two countries in renewable energy R&D. For example, the renewable energy R&D funding of the United States is several magnitude larger than that of China, both in terms of actual amount and as a percentage of total GDP. Furthermore, the level of collaboration between government and industry is very high in the United States. Many states also actively participate and support R&D activities. Government works closely with renewable energy industry in determining R&D strategies and objectives. In China almost all renewable energy R&D activities are carried out by the central government. Local government and industry rarely participate in renewable energy R&D. It is no accident that the United States leads the world in many renewable energy technologies.

6.4 Comparison of Market Development Measures

Both Chinese and American governments have initiated policies aimed at improving nontechnical infrastructure needed for commercializing renewable energy technologies. A description of measures by both countries in developing the market for renewables are discussed in Chapter 4 and Chapter 5 of this report. Experience has suggested that reducing market barriers for renewable energy technologies is critical in commercializing renewable energy technologies. It is more difficult than solving technical and economic problems. Improving market infrastructure involves changes in electric system operations and business practices which are country-specific. It requires continuous efforts of both countries to overcome these barriers.

7. Conclusions and Recommendations

In summary, we can see that both United States and Chinese Governments have undertaken a series of policy, economic, market, and research and development measures to advance the renewable energy technologies and their deployment. These past measures have helped both countries accomplishing many positive results. However, there is still a long way before renewable energy resources can achieve their long-term potential and developmental goal. Further improvement in technology and market development are still necessary. Based on domestic and international experiences, both Governments, especially Chinese Government, need to take further actions to supplement and improve existing renewable energy policies and other incentive measures. To this end, we would like to make the following suggestions for the considerations of the Chinese Government to formulate her own renewable energy policies.

7.1 Strengthen Renewable Energy Legislation

Promoting the development of renewable energy technologies through comprehensive legislature is effective. This is a tried and true measure in many countries. In China, both Electric Power Law of 1996 and Energy Conservation Law of 1998 affirm the strategic importance of renewable energy and the government's resolution to support renewable energy. Now the critical issue is for the responsible government agencies and authorities to put in place detailed rules and regulations to implement the established policy goals. For example, detailed specifications of

eligible renewable energy technologies for government support, reasonable levels of renewable energy capacity in each grid, the requirements for power grid to provide convenient grid connections for renewable energy power plants and buy all the electricity at fixed price, and economic and technical goals of supported renewable energy technologies should be unequivocally stipulated in the law. Lacking specific details will hamper the implementation of the laws in providing support to the renewable energy technologies.

7.2 Establish the new pricing principle (price of electricity to include production cost, repayment of debt and interests, taxes, and reasonable profit) for all renewable energy technologies.

In 1994, the Ministry of Electric Power issued an executive order establishing the pricing principle for wind power to include production cost, repayment of debt and interests, taxes, and reasonable profits. The order also stipulated that power grids must purchase all the electricity generated by wind power plants and the difference in prices between the renewable energy technologies and the average market price should be borne by all the customers of the power grid, not just the customers closest to the renewable energy projects. However, the extent of a power grid was not clearly defined in the order, and confusions and disputes often arose as exactly what customers in the grid were required to bear the price difference. It is suggested that this order be revised to clarify the confusion and also extend to cover all renewable energy technologies in addition to wind.

7.3 Continue and Expand Current Tax Incentives for Renewables

Current tax incentives for renewables should be continued with some modifications to ensure their effectiveness in achieving policy goals.

- (1) Currently, income taxes for biogas and bagasse power technologies are exempted for five years. It is suggested that this incentive be continued and extended to other renewable energy technologies and non-electric application of renewable resources.
- (2) VAT for small hydro applications is reduced to 6%. This tax incentive should be continued and extended to other renewable energy technologies. Capital costs for renewable energy technologies are higher than conventional power technologies, but they have no fuel cost. Although renewables currently have the same VAT rate as conventional power technologies, the actual burden for renewables is much higher than that of the conventional power technologies because renewables cannot deduct fuel VAT.
- (3) Government should establish the conditions under which a renewable energy technology can receive government support and the goals a renewable energy technology must attain.

7.4 Increase Renewable Energy RD&D Funding and Bank Credit for Renewables to Accelerate Renewable Energy Technologies and Domestic Manufacturing Capabilities

The United States and other developed countries have spent billions of dollars in research, development and demonstration (RD&D) of renewable energy technologies. Chinese renewable

energy technologies still lag behind those countries, and China lacks domestic manufacturing capabilities. In order to deploy renewable energy technologies in China in large scale, improvement in certain technologies and domestic manufacturing capabilities are needed. Taking into considerations of the needs and current situations, it is suggested that the following measures to be adopted by the government.

- (1) Renewable energy R&D should be listed as part of the national technical improvement and investment programs.
- (2) Increase R&D funding for renewable energy technologies. Actual spending should increase as the economy grows.
- (3) Establish special line of credit for renewable energy technologies. The amount of low interest loans should increase above the 120 million yuans that is earmarked for rural energy and renewable energy every year.
- (4) To help promoting domestic manufacturing capability, renewable energy technology enterprises will have top priority in receiving financial support from policy banks such as subsidies and low interest loans.
- (5) Exempt or reduce VATs for renewable energy project using domestic manufactured equipment and parts to reduce the cost of domestic manufactured renewable energy facilities.

7.5 Establish New Business Practice and Operating Standard

For non-financial incentive policies, it is suggested that the government should gradually establish new business practice and operating standards in all aspects of renewable energy development activities. For example, the practices of fair competition and public bidding should be adopted during for all technology development activities including R&D, demonstration, and commercialization projects. Participation in these activities by the industry through cost-sharing, risk-sharing, and profit-sharing should especially be encouraged.

7.6 Heighten Training and Communication Efforts

It is important to increase the awareness of the public (especially officials at provincial and local government levels and entrepreneurs) on the protection of the environment and the benefits of renewable energy technologies. We need to stimulate public interest and public participation in renewable energy development activities through increased efforts on communication and training. Public awareness of environmental protection and renewable energy benefits can increase the public willingness to invest in renewable energy. The training and communication efforts should be included in the government programs and provided with adequate funding.